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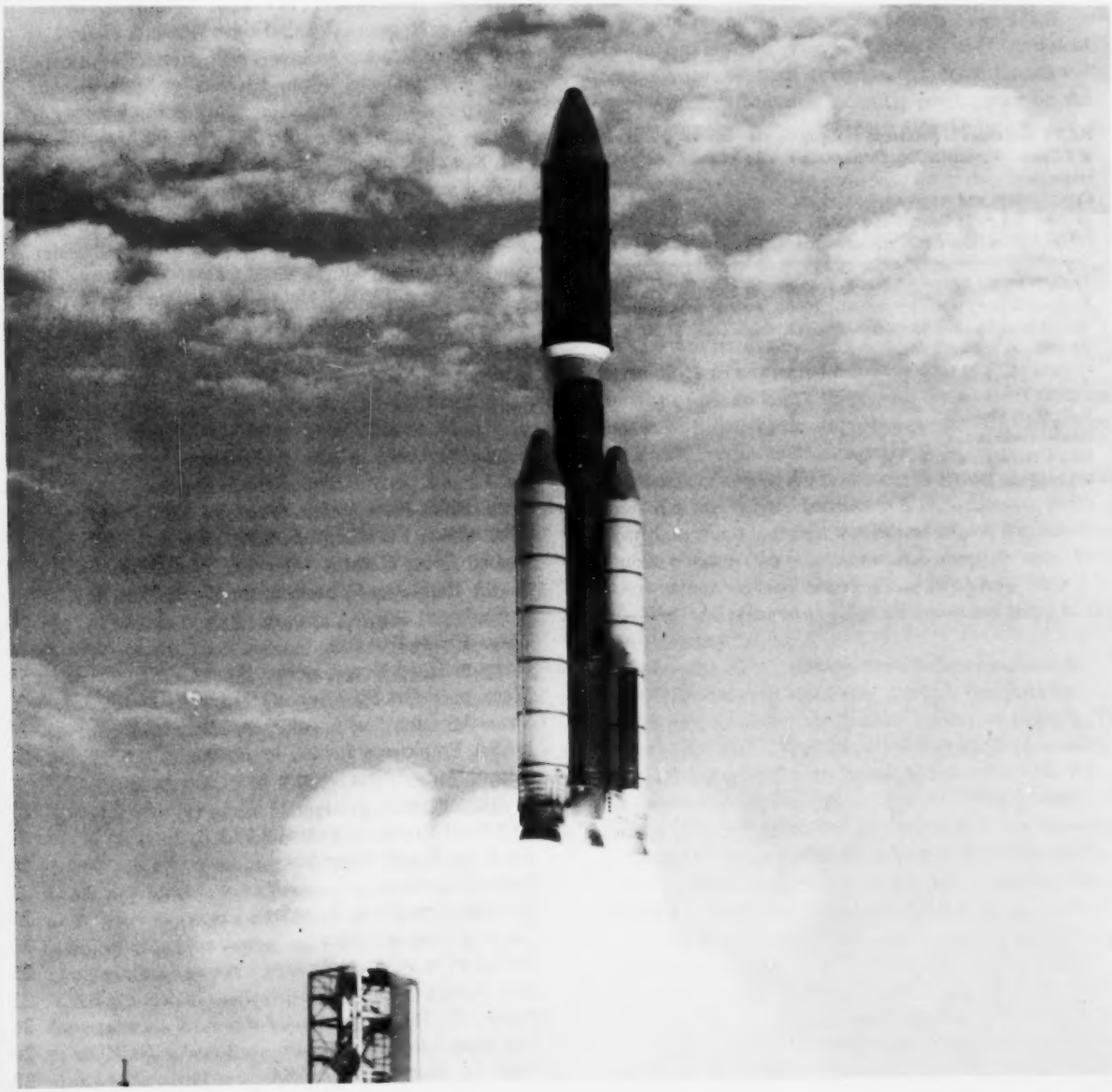

COVER

Viking I as it was launched by a Titan/Centaur rocket from Complex 41 at Cape Canaveral Air Force Station on its way to Mars.

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Monthly NASA Highlights

Astronaut Slayton Is Recovering from Surgery

Donald K. Slayton, one of the nation's original seven Mercury astronauts, is recovering from exploratory lung surgery performed on August 26. A small lesion, about the size of a pencil eraser, was discovered during the extensive medical examinations following the Apollo Soyuz space mission. It was found to be benign.

Slayton, America's oldest astronaut at 51, was grounded in 1962 because of a heart irregularity. He was returned to active flight status and flew on the Apollo Soyuz Test Project, his first mission in space.

The tumor was not detected during the preflight examinations because it was so small. When the astronauts were hospitalized after breathing poisonous rocket propellant fumes which filled the Command Module during splashdown, a small round shadow in the lower portion of Slayton's left lung was spotted in the extensive series of X-rays each of the three-man crew underwent.

Mayor Kilgore Speaks at NASA Headquarters

Mrs. Ann Kilgore, Mayor of Hampton, VA, and wife of the Director of Operations at Langley Research Center, was the guest speaker at a program sponsored at NASA Headquarters by the International Women's Year Speakers Program Subcommittee. She was introduced by Gen. Duward L. Crow, Acting Associate Deputy Administrator.

In 1959, Mrs. Kilgore was the first woman to be elected a member of the Hampton City Council. In 1963, she was elected to the office of Mayor.

Mayor Kilgore, whose topic was "Experiences of a Woman in Government," related some of her reactions and observations as a woman in local government. She is one of only four women mayors in the United States in cities with a population of more than 100,000.

After her talk, she was presented with a piece of International Women's Year jewelry and with a picture of the Earth taken during the Apollo 17 mission. She also was honored at a luncheon.

The year 1975 has been declared by the United Nations as International Women's Year throughout the world. The month of November has been set aside as NASA Headquarters Federal Women's Month. A variety of programs and activities is being planned at Headquarters in conjunction with International Women's Year.

National Science and Technology Bicentennial Exposition

Congressman Louis Frey, Jr., (R-FL), has announced that President Ford has designated Cape Canaveral as the site for a National Science and Technology Bicentennial Exposition. NASA will function as both host and sponsor of the event.

The theme of the exposition will be "The Third Century of Human Progress Under Free Government." Cape Canaveral, with its remarkable scientific feats during the last 20 years, including putting men on the Moon, represents the long reach into the future, and the exhibit will be aimed at exploring the outlook for the next century.

All government agencies with appropriate interest in science and progress will be urged to contribute exhibits. Private industry also will be invited to participate.

"We are not interested in science and technology purely as a material force," said Dr. James C. Fletcher, NASA Administrator. "We are interested in science and technology as a spiritual inspiration to the improved quality of life on Earth. Exploring the heavens ultimately has as its objective the improvement of man's existence on Earth. NASA came into being as an answer to the challenge of space. We now move forward to the application of what we have learned to the enrichment of life on Earth. In this exposition it is hoped to give the American public a vision of a wholesome and happy future. We know where we have been the last 200 years. Now it is the time and place to explore where we are going in the next century."

After the initial start-up period, the exposition is expected to be self-sustaining through fees paid by exhibitors, as well as by nominal admission charges. The present visitors' center already accommodates a million tourists a year and, with the expanded attraction, it is expected that several million will visit the exposition in 1976. June 14, 1976, is the target date for the opening.

John W. Warner, Administrator of the National Bicentennial Administration, hailed the President's decision to move forward on this project as follows:

"This program under the sponsorship of a Government agency with a proven track record of success—the National Aeronautics and Space Administration—will be the capstone of the many fine programs being sponsored by the departments and agencies of the Federal Government. As the Bicentennial moves rapidly forward, more

and more Americans are clamoring for programs directed towards our country's future potential. Where better to launch the scientific and technological genius of America —the finest in the world—into the third century than at Cape Canaveral?"

European Space Agency Satellite Launched

The COS-B spacecraft was successfully launched from the Western Test Range in California on August 8. The launch was rescheduled from August 6 because of an equipment problem in the support aircraft assigned to provide coverage during the third stage burn and spacecraft separation.

The Delta launch vehicle performance was nominal, and it is reported that the spacecraft is in a good orbit. This launch is the 103rd Delta vehicle to successfully put a satellite into orbit. The Delta Program is managed for the Office of Space Science by the Goddard Space Flight Center.

The COS-B is a scientific satellite developed by the European Space Agency to study extraterrestrial gamma radiation.

Second French/German Communications Satellite Launched by NASA

Symphonie-B, the second French/German communications satellite, was successfully launched aboard a Delta rocket from the Kennedy Space Center on August 26. The experimental satellite will test and demonstrate communications equipment, radio, telephone, telegraph and data transmissions. It will be capable of transmitting between ground stations in portions of South America, Europe and Africa.

The Symphonie-B spacecraft was launched by a three-stage, thrust-augmented Delta 2914 launch vehicle. Delta performance was nominal and placed the spacecraft in a near-perfect transfer orbit.

A series of maneuvers was performed to place the spacecraft in the proper attitude for apogee motor firing. The liquid-fueled apogee motor was scheduled to be fired at the sixth apogee to place the spacecraft in its planned synchronous orbit. The first use of liquid fuel for the apogee motor of a satellite in synchronous orbit was on the Symphonie-A spacecraft, launched on Dec. 18, 1974.

NASA Satellites Used in Marine Survey

NASA and the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) are sponsoring a survey of the coastal waters of Alabama, Louisiana and Mississippi. NASA's LANDSATs 1 and 2 will be used, along with the NOAA-2 weather satellite, vessels of a commercial fishing fleet, oceanographic research ships, aircraft and marine oil platforms, in a cooperative effort to gather information on the marine environment of the Gulf of Mexico.

The 18-month space-air-sea survey will study conditions in the Gulf that may influence living marine resources and determine if remote sensing can aid in the management and harvest of fish species caught in the waters.

The data collected from the cameras, electronic scanners and sensing equipment aboard the aircraft, spacecraft and spotter planes will be correlated with the logs of the fishing boats describing the quantities and kinds of fish caught and weather and oceanographic conditions. Scientists aboard the research vessels and marine platforms will monitor oceanographic conditions, recording water temperature, chemical makeup, current flow, turbidity, and color. Results of this and similar studies may assist in resolving problems related to marine resource management and conservation measures while continuing to produce a high annual yield of fishery products.

First Issue of Cost Systems Catalog Published

The Low Cost Systems Office has published the first issue of its Catalog of Available and Standard Hardware (CASH).

In final form, the catalog will have complete information on hardware already declared as standard and an index of other flight-qualified hardware suitable for other flight missions. The first issue contains only the information on the standard equipment and a listing of other cataloguing efforts.

The next issue will include the index of available hardware, which will direct the reader to a field center where a terminal operator will retrieve the necessary information from the computer facility at Slidell, LA.

The data bank is now being loaded with the necessary information. The retrieval capability is already operational at Headquarters and at some field centers.

The Small Jet Engine Research Program

Under the aeronautical propulsion program of the Office of Aeronautics and Space Technology, the Lewis Research Center conducts research activities directed at solving problems peculiar to small gas turbines.

Most of the American public's association with jet aircraft is with large commercial transports. These big aircraft weigh several hundred thousand pounds and their engines produce large thrust forces ranging from 15,000 pounds to as high as 50,000 pounds. Over 2,000 of these large jet aircraft serve the nation's airlines.

In contrast to these commercial jets are the small jet aircraft used by business. These weigh from 10,000 to 15,000 pounds, and their engines develop thrusts of

2,000 to 4,000 pounds. In addition, the Army has a fleet of about 9,000 turbine-powered helicopters, the engines of which are close relatives and, in some cases, derivatives of the small jet engines.

Due to the small size of the engines required for business jets and turbine-powered helicopters, it is most difficult to improve efficiencies, to reduce polluting emissions, and to maintain durability. Thus the Lewis program is investigating the effects of small size on the performance of turbines, combustors, and compressors needed for these small engines.

A special aspect of the small jet engine research program is support for the Army's helicopter propulsion requirements provided under an agreement signed in the late 1960s between NASA and the Air Mobility Research and Development Laboratory of the U.S. Army. The agreement provides means for NASA to assist the Army in expanding its overall aeronautical research capabilities for helicopters and includes co-location of more than 250 technical personnel from the Army at the Ames, Langley, and Lewis Research Centers. These personnel gain practical experience in the laboratories working on all helicopter-related problems, including propulsion, and the Centers gain the benefit of support provided by highly-qualified engineers and technicians. ■■■

JSC, MSFC and LaRC Awards Become Part of Skylab History

Employees Who Saved Spacecraft, Including Team That Developed Parasol, Are Presented $23,750

Along with the continued assessment and evaluation of the information made available by the Skylab program, NASA has made a concerted effort in recent months to reward those of its employees most responsible for salvaging the anomaly-threatened Skylab 1. What they did adds up to an unprecedented saga of American scientific ingenuity and improvisation.

By way of tangible appreciation, a total of $23,750 in monetary awards was granted to employees of the Johnson Space Center, Marshall Space Flight Center and Langley Research Center for their contributions to the rescue operation.

Of the total, $12,750 was divided among 12 employees of the Johnson Space Center. The presentation was made by Dr. Christopher C. Kraft, JSC Director, assisted by Ronald Engel, Chief of the Awards Branch of the Inventions and Contributions Board.

Ten thousand dollars went to the team that developed and implemented the parasol concept that kept Skylab 1 in operation. It was the third largest award NASA has ever made and the largest monetary award it has ever presented a group of JSC employees.

A part of the overall team award, $4,500, was received by Jack S. Kinzler, Chief of the JSC Technical Services Division. This represented the largest award ever made to an individual JSC employee.

Donald D. Arabian, Director of the Program Operations Office, leader of the team, received $2,500, and James V. Correale, Chief of the Crew Systems Division, and Jack A. Jones, Chief of the Quality Assurance Division, each was awarded $1,000.

There were other individual recognitions. James D. Williams, Acting Assistant Chief for Engineering, Engineering Division, received $1,000 as a reward for directing the detailed design of parts for the parasol system and seeing that all technical requirements of the Skylab parasol team were met.

Six JSC employees received awards ranging from $250 to $500 for developing an alternate thermal shielding device, the Standup Extravehicular Activity (SEVA) Sail. They were William K. Creasy, Head, Mechanical Design Section, Spacecraft Design Division; Maxime A. Faget, Director of Engineering and Development; Caldwell C. Johnson, Jr., (retired), former Chief, Spacecraft Design Division; John W. Kiker, Chief, Mechanical Systems Branch, Spacecraft Design Division; Charles C. Lutz, Chief, Protective Equipment Branch, Crew Systems Division; and William W. Petynia, Assistant Chief for Design and Mechanical Systems, Spacecraft Design Division.

A final award of $1,000 was made to Gary W. Johnson, Chief, Equipment and Installation Section, Control Systems Development Division, for his development of an emergency docking probe retract mechanism and procedure which, after several attempts to dock the Command Module with the Skylab orbital workshop failed, was successfully employed.

At MSFC, 56 awards totaling $10,000, in amounts of $320 (20 employees) and $100 (36 employees), were granted to individuals who contributed to the development and implementation of the Twin Pole Sail concept, as follows:

Charles E. Cataldo, James E. Curry, Ralph Diamond, Richard E. Dotson, James H. Ehl, Robert G. Eudy, George D. Hopson, Harry M. King, Raymond L. Gause, Carolyn S. Griner, Richard T. Heckman, Gustav A. Kroll, Clyde D. Nevins, Roy E. Runkle, Robert J. Schwinghamer, Jerry W. Smelser, James R. Smith, James L. Splawn, J. Robert Thompson, Jr.

Donald L. Turpen, Eva M. Alverson, Frank R. Batty, Richard L. Beck, Sr., Larry J. Bradford, William G. Breithaupt, Bobby E. Cothren, Walter G. Crumpton, Charles A. Faulkner, Jr., Martin A. Ferrario, Douglas B. Franklin, Thomas H. Hollingsworth, Jackson C. Horton, Alvin Q. Hudgins, Billy G. Kennedy, Carlo F. Key, Eugene I. Kirkland, Charles M. Lewis, Jerrol W. Littles.

Eugene C. McKanna, John D. Moss, John R. Nunnelley, Hobert H. Ogle, Jr., William C. Patterson,

Skylab Award Gathering—Here are assembled the participants in the ceremony at which 12 Johnson Space Center employees were rewarded for their efforts in rescuing the Skylab spacecraft. Seated front, left to right, they are Jack A. Jones, Jack A. Kinzler, James D. Williams and Javes V. Correale; seated at rear of table, John W. Kiker, William K. Creasy, Gary W. Johnson, Dr. Maxime A. Faget, Caldwell C. Johnson, Jr., William W. Petyniz, Donald D. Arabian and Charles C. Lutz; behind them, Ronal Engel and Dr. Christopher C. Kraft, JSC Director (standing).

Charles L. Peacock, Jr., Sam B. Prestwood, Wilbur A. Riehl, John T. Schell, Jr., James M. Stuckey, Leldon M. Thompson, Fritz A. Vandersee, Jackie C. Walker, Robert E. Webber, John S. Welzyn, Ann F. Whitaker, Charles F. Smith, William T. White.

Finally, each of 10 LaRC employees received an award of $100 for conceiving and fabricating an inflatable shield which was flown to Kennedy Space Center for standby reasons in case one of the other thermal shields was not ready for launch. They are E. Barton Geer, Hubert K. Clark, Robert C. Wells, Vernon L. Alley, Jr., Austin D. McHatton, Joseph V. Boyle, Thomas N. Bartron, James N. Chacamaty, Robert T. Sherrill, and Nathan D. Watson.

It all goes back to that May day in 1973 when Skylab 1, within minutes after launch, lost an aluminum shield designed to protect the orbital workshop from micrometeorite penetration and thermal overheating. Scientists who were at Kennedy Space Center to witness the blast-off went back to their posts in serious moods, aware that something had to be done—and done quickly—to rescue the mission.

For the next few days, office hours were ignored and sleep was at a minimum. At JSC, team members worked around the clock, eating sandwiches from one hand while working with the other and occasionally calling home to let their families know they were still on the job.

Kinzler was among several at JSC who came up with ideas, but his eventually was adopted. He knew they had to devise something that would fit into the Command Module in which the Skylab would be traveling to reach the damaged spacecraft. He also was aware that what was needed was a sunshade of some sort that could be deployed from inside the cabin and through the eight-and-a-half-inch-square scientific port.

Years of experience lay behind Kinzler. He had been at Langley Research Center before coming to Houston, working on such projects as Mercury and Echo. This enabled him to visualize the problem at hand.

Within hours after the burden was laid in his lap, Kinzler was phoning, pursuing the idea that had come to him. At one of the larger Houston tackle shops he located a 14-foot-long collapsible fiberglass fishing rod. Out went a messenger with the money to bring one back to his office.

Upon examining it, Kinzler found that it consisted of four individual rods that telescoped into an 18-inch package. This would be small enough to fit into the Command Module.

He next had an employee sew up a 20-foot-square silk parachute. In the meantime, he took the four rods and designed for them a base hub fitted with a coil spring. This put him on his way. The entire layout—rods and parachute—were stuffed into a simple aluminum canister.

So originated the pattern from which the sunshade that saved Skylab finally was fashioned—but not until after long days of labor and teamwork.

Schneider Receives AAS's Highest Award

William C. Schneider, Deputy Associate Administrator for Manned Space Flight, was presented the American Astronautical Society's highest tribute, the Space Flight Award, at its 21st annual meeting in Denver, CO, recently.

The award is given annually in acknowledgment of outstanding effort and achievement in contributing to the advancement of space flight and space science.

Other NASA recipients include Wernher von Braun, Homer E. Newell, Hugh L. Dryden, Robert R. Gilruth, Kurt H. Debus, William H. Pickering, George Low,

George Mueller, Chris Kraft, Ed Cortright, Charles W. Mathews and Rocco Petrone.

Also honored at the Denver meeting was Sen. Frank E. Moss of Utah, Chairman of the Senate Committee on Aeronautical and Space Sciences, who was the recipient of the AAS's first John F. Kennedy Astronautics Award; and Skylab 3 Astronauts Alan L. Bean, Owen K. Garriott and Jack R. Lousma, who received the Flight Achievement Award in recognition of their 59 days in space.

As Director of the Skylab Program, the position he held before becoming Deputy Associate Administrator, Schneider, along with the three Skylab crews, received the Robert J. Collier Trophy. Earlier, he was presented with the Astronautics Engineer Award of the National Space Club.

Stafford to Head Air Force Test Center

Maj. Gen. Thomas P. Stafford, veteran of four space flights, will leave his assignment as a NASA astronaut, effective Nov. 1, 1975, to become Commander of the U.S. Air Force Flight Test Center at Edwards Air Force Base in California.

A graduate of the USAF Experimental Flight Test School at the Center he is to command, Stafford was stationed there between 1958 and 1962 and became Chief of the Aerospace Research Pilot School performance branch, serving as an instructor in flight test training.

He was a member of the second group of astronauts to be chosen. He flew on Gemini 6 and was Commander of the Gemini 9, Apollo 10 and ASTP missions.

After 9-Day Delay, Viking I Heads for Mars

Satellite Is Expected to Reach Destination Next June 19, with Landing Likely July 4–7

Leaving a trail of brilliant flame, Viking I took off in a spectacular ascent toward its 420-million-statute-mile, 303-day journey to Mars. The launch of the unmanned vehicle from Cape Canaveral originally was scheduled for August 11, but, because of a faulty valve in one of the solid rocket motors on the Titan booster and a rundown battery on the Orbiter, it was delayed until August 20.

During the terminal countdown on August 11, engineers discovered one of the 24 valves inside the nozzle of one of the two solid fuel engines used to control steering of the first stages of the rocket failed to return to its proper closed position. This would cause an excessive usage of thrust vector control propellant during flight.

Two days later it was found that one of the batteries on the Orbiter was running low due to a malfunction of a motorized rotary switch that drained the power. The battery's normal charge of 36 volts was down to nine volts. These batteries were designed to provide backup power to the four solar panels on the Orbiter and are required when the spacecraft is in the Earth's or Mars' shadow.

Viking Project Manager James S. Martin of Langley Research Center, which manages the Viking, and John J. Neilon, Director of Unmanned Launch operations at Kennedy Space Center, reached the decision to replace the Viking-A spacecraft with Viking-B. They were optimistic that some time could be trimmed from the 10-day turnaround schedule originally foreseen by keeping the launch vehicle fueled during the spacecraft substitution.

By working around the clock, contractor and NASA personnel switched the two spacecraft. "The determination that the spacecraft change could be made safely without removing the propellants from the rocket was one of the key items that saved time," Neilon said.

Working under tight schedule in an orderly manner, according to Neilon, has always been the trademark of the Viking team. It is composed of several hundred men, including representatives of the Jet Propulsion Laboratory, Martin Marietta Corp., General Dynamics Convair, Langley's Viking Project Office, United Technical Corp., Kennedy Space Center, associated contractors and other NASA personnel.

According to Don Ward of LaRC, who was the Launch Operations Integration Officer for Viking at KSC, one master schedule was followed by everyone.

"To run a multi-complex operation like the Viking Project, we had to work by a schedule," he explained. "The contractors and representatives from other Centers met twice a week to develop working schedules and to uncover any problems."

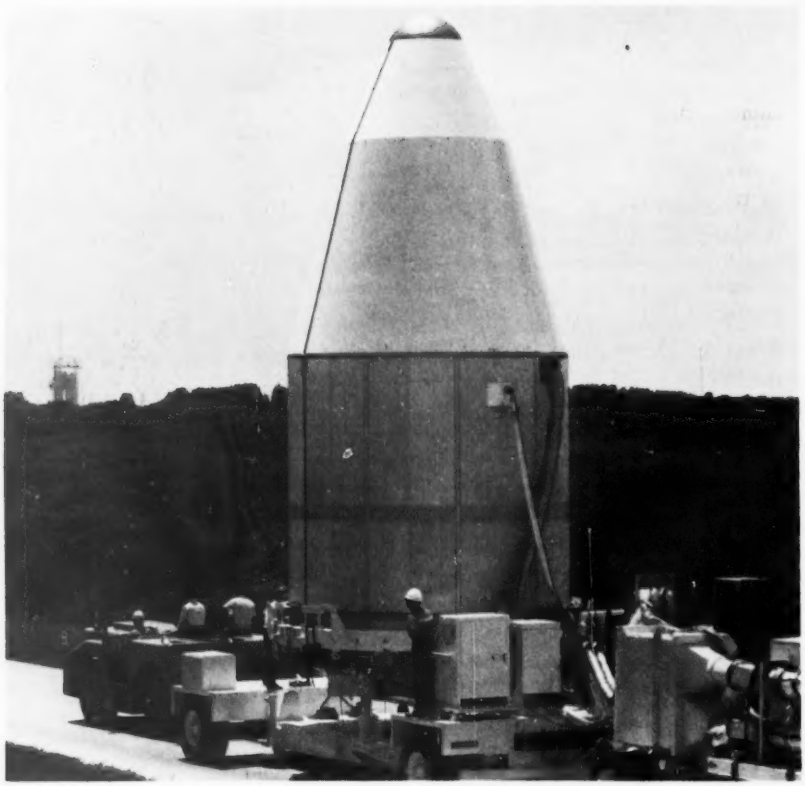
Called ISOP (Integrated Spacecraft Operations Plan), the master plan contained schedules for monthly, weekly and daily work schedules, procedures for every test operation, and weekly and daily planning meetings.

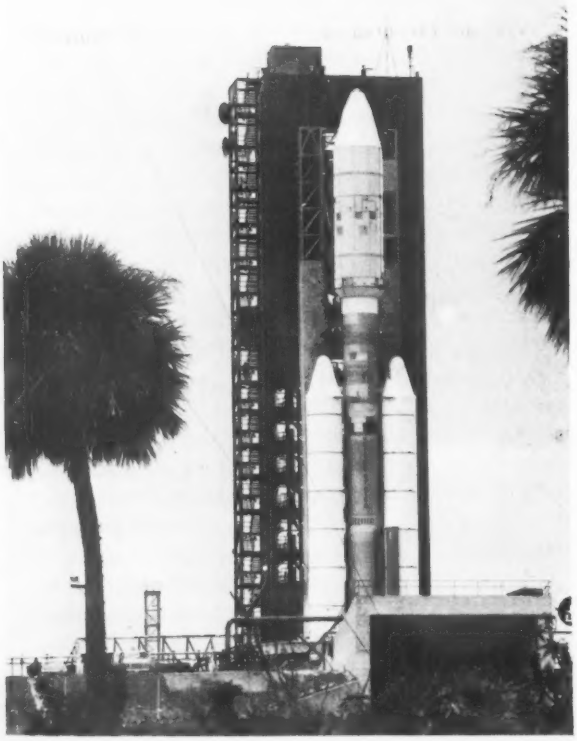
The ISOP was scheduled and updated almost hourly by Santo Bertuzzi, Planning and Control Manager from Martin Marietta Corp. He perfected another set of schedules on a handy pocket-size card that showed 72 hours (three days) of operation activities.

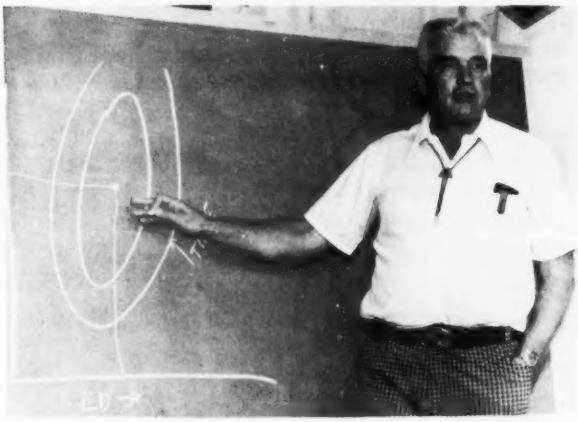
"So we can see what was accomplished yesterday, what has to be done today, and start to plan for the next day," Bertuzzi explained. "Time was our prime concern because, if we got behind somewhere along the way, eventually we might be set back as much as two years. That can mean disaster because of the increase in cost of manpower and materials."

However, according to Bertuzzi, since the Viking crew began to work at KSC, his record has shown every operation to be at least two or three days ahead of schedule.

Beginning during the summer of 1974, thousands of pieces of hardware and components designed and manu-







Ready to Go—After the anomaly occurred to the Viking-A spacecraft, Viking-B, as shown in the photograph at top, was moved from KSC's Spacecraft Assembly and Encapsulation Facility and substituted for it. Titan-Centaur 4 stands at Launch Complex 41 ready to send it aloft. Dr. James Martin, Jr., Viking Project Manager, is pictured as he briefed the press with reference to the postponed launch date.

factured in various factories and industries reached KSC and Cape Canaveral to be assembled at different sites and buildings. The first to arrive was the Titan/Centaur launch vehicle.

Lewis Research Center, the prime contractor for the booster, had the Centaur built by General Dynamics Convair Astronautics. Titan was built by Martin Marietta Corp. of Denver, CO. Will Watson of Langley was the head of Launch Vehicle Operations. The activities at Complex 41, the launch pad for the Viking spacecraft, and the launch operations were managed by KSC personnel, supervised by John Gossett, Launch Operations Manager.

The sterilization of the Lander was under the management of LaRC's Leo Daspit. The Landers were built at Martin Marietta Corp. and were delivered at different times in specially-built vans. The caravan arrived at KSC one day in January, 1975—a first milestone in the life of a long-distance traveler. The Lander operation at KSC was managed by Walter Lowrie of Martin Marietta.

The Orbiters were contracted to JPL, and components began to arrive in September, 1974. The Centaur shrouds came packed in seven cartons and were assembled in hangar AF, from which they were later moved to the Spacecraft Assembly and Encapsulation Facility. Henry Norris of JPL was the Director of Orbiter activities.

The liftoff from Complex 41 came on schedule, exactly at 5:22 p.m., at the beginning of a 71-minute launch "window."

Thirty-four minutes after liftoff, the 7,775-pound spacecraft was separated from Centaur above the Indian Ocean on a Mars trajectory. The Orbiter deployed its energy-producing solar panels, locked on the Sun and then locked on another guide-star, Canopus. Then the Lander's bioshield cap was jettisoned.

At this time, Project Manager Martin, who was also the Mission Director at KSC's Control Room, passed on the responsibility to the Mission Control Team at JPL, headed by LaRC's A. Thomas Young.

At a post-launch news conference, Martin commented: "We're finally on our way, and Viking I is on a perfect course to Mars." Asked about the landing date, he replied, "We will land when it is safe to land. That could be before July 4 or after July 4."

He added that it might be possible to reach Mars a day earlier than had been planned by firing the engines for a longer period than scheduled during a mid-course correction. Nominal arrival at Mars is scheduled for June 19.

Getting to Mars as early as possibly would give more time to perform scientific investigations. Among the 13 experiments to be conducted by the Orbiter and Lander are three separate biology investigations to detect life on the planet. Therefore, the prime landing site for the Lander is Chryse, a low, flat, smooth region near the northern end of the 2,500-mile-long, 20,000-foot-deep Martian "Grand Canyon."

Based on a nominal arrival time at Mars around June 19 and an orbit of 18 days for landing site verification, the Viking I Lander will make its descent to the Mars surface July 4–7, 1976.

Bowen Named to Management Position at Langley

Fred W. Bowen, Jr.

Fred W. Bowen, Jr., Executive Assistant to the Associate Administrator for Center Operations at Headquarters, has been appointed to the new position of Technical Manager for Management Operations at the Langley Research Center.

In his new position, Bowen will report to Edwin C. Kilgore, Director for Management Operations. He will have responsibility for LaRC's programs in the areas of technology utilization and application, scientific and technical information, occupational health services, and technical library activities. In addition he will assist in the overall management of directorate operations and activities such as financial management, management support, personnel, business data systems, procurement and programs and resources.

He has been in his present position at Headquarters since March, 1974. From 1972 to 1974, he served as the executive and technical assistant to the Associate Administrator for Aeronautics and Space Technology.

A native of Newport News, VA, Bowen joined the Langley staff shortly after his graduation from the College of William and Mary in 1964. Starting as a researcher in the Plasma Physics Section, he later became a member of the Director's Research Staff Office and, prior to transferring to Washington, served for three years as Technical Assistant to the Viking Project Manager.

Astrologers in Thailand Predicted ASTP Link-up

The American Embassy at Bankok, Thailand, notified NASA by message dated four days before the ASTP launches that local members of an astrologers' association had predicted a successful link-up of the American and Soviet spacecraft.

The message, dispatched July 11, follows:

"The Embassy just received a letter in Thai that local members of the Astrologers Association of Thailand (AAT) prepared during conferences July 5 and 6. The topic was the pending Apollo-Soyuz program. The AAT meticulously evaluated the flight crews' personal data,

and carefully plotted the data on one of the circular astrological charts familiar throughout southeast Asia. The AAT predicts a successful link-up on July 17. Congratulations."

Dr. Schmitt Resigns from NASA

Dr. Harrison H. (Jack) Schmitt, Assistant Administrator for Energy Programs since May, 1974, has resigned from NASA, effective August 30, to return to his home state of New Mexico in order to pursue geological consulting and personal activities.

Dr. Schmitt was appointed to his present position as public awareness of the energy problem surged to the fore in the wake of the oil embargo. He was given responsibility for coordinating NASA energy research and development activities, and for managing NASA programs and applying aeronautics and space technology to the generation, transmission, storage, conservation, utilization and management of energy for terrestrial applications in support of other Federal agencies.

His Office of Energy Programs has expanded NASA's energy activity to include the conduct of programs for the Energy Research and Development Administration (ERDA) and the Department of the Interior in areas such as solar energy, automotive propulsion and coal mining. The office also has instituted studies related to large power stations in space.

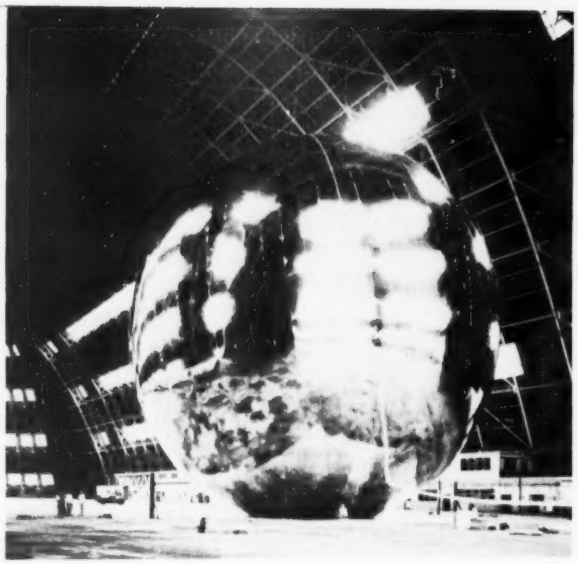
Dr. Schmitt, a geologist by profession, previously was Chief of the Astronaut Office at Johnson Space Center. He was selected as a scientist-astronaut by NASA in 1965, became backup lunar module pilot for Apollo 15 and, in December, 1972, made his first journey into space as the lunar module pilot on Apollo 17, the last manned Apollo mission to explore the Moon.

15th Anniversary of Echo-1 Launch Observed

The 15th year since the launch of Echo-1, the world's first passive communications satellite, came to a close on August 12, recalling memories of the balloon-like instrument that was probably seen by more people than any other manmade object in orbit and was perhaps the most visible evidence of the U.S. space program.

Sparkling brighter than the North Star as it passed over most of the Earth's populated areas, the big aluminum-coated balloon, designed and developed at the Langley Research Center, caught the imagination of millions of persons around the world. Newspapers published daily schedules of when and where to look for it. Astronomers and Boy Scouts tracked it. Fan clubs sprang up in schools.

Echo-1 roared into orbit from Cape Canaveral the morning of Aug. 12, 1960, inside a 66-centimenter



(26½-inch) sphere on the nose of a Delta rocket. About 1,600 kilometers (1,000 miles) up, the container was split open by an explosive charge, and the 30-meter (100-foot) plastic balloon was inflated as powdered chemicals inside it were warmed by the Sun and vaporized into gas.

Circling the globe every two hours, the satellite served as a passive radio reflector in space, bouncing signals from one point on Earth back to another at up to intercontinental distances. Its first transmission, near the end of the first orbit, included the following recorded message relayed from Goldstone, CA, to Holmdel, NJ:

"This is President Eisenhower speaking . . . The satellite balloon which has reflected these words may be used freely by any nation for similar experiments in its own interests."

Expected to stay up a year, Echo-1, forerunner of ATS-6, the most complex and versatile communications satellite ever developed, lasted nearly eight years and logged more than a billion miles. Gradually its gas leaked and its skin, bombarded by meteorites and space dust became wrinkled. By the time it was pushed by the solar wind and pulled by gravity back into the atmosphere to burn up off the west coast of South America the night of June 23, 1968, the age of regular, reliable communications via space had begun.

Did You Know?

Marshall Space Flight Center issued contracts totaling $2,715,477 to minority businesses during fiscal year 1975. This was $200,000 more than the goal of $2.5 million and does not include subcontracts awarded to minority businesses by major MSFC contractors.

The Saturn IB that launched American astronauts into space for the linkup with the Soviet spaceship in the Apollo Soyuz Test Project Mission marked the end of the Saturn series and also was the vehicle's most perfect launch, according to Ellery B. May, Manager of the Saturn Program Office at the Marshall Space Flight Center.

Although this Saturn IB had the oldest engine ever used—over nine years old—the astronauts experienced a flight that was closer to predicted conditions than any previous Saturn IB flight, May said.

NASA and the USSR Academy of Sciences have agreed on a joint tour of the U.S. and the Soviet Union by the American and Soviet crews of the recently completed Apollo Soyuz Test Project. Each nation will accredit and make necessary arrangements for 10 media representatives of the other country to accompany the official party throughout the tour of its country.

The first INTELSAT IV-A commercial communications satellite, with nearly twice the capacity of the INTELSATS now in use, will be launched by NASA aboard an Atlas/Centaur rocket from Cape Canaveral no earlier than Oct. 2 for service in the Atlantic.

This first INTELSAT IV-A supplements the INTELSAT IV worldwide network of seven operating satellites—three over the Atlantic, two over the Pacific and two over the Indian Ocean. These spacecraft are able to carry approximately 6,000 two-way telephone conversations and television.

A unique crystal grown in the weightless environment of space aboard the Skylab space station will be placed on permanent display in the lobby of the Alabama Space and Rocket Center at MSFC. It is a germanium selenide crystal, the largest of its particular type grown in the Skylab experiment, and will be the only such crystal on public display.

Certain "backup" Skylab space station hardware, built but not needed in the Skylab program, will be placed on display in the National Air and Space Museum at the Smithsonian Institution. Included will be an Orbital Workshop, core of the Skylab cluster, an Airlock Module and a Multiple Docking Adapter.

Capt. Jacques Cousteau, ocean explorer, began a three-day oceanic experiment in the Bahamas Aug. 27 in which research ships and NASA spacecraft joined forces to collect data on uncharted underwater features. It is thought such information could be of significant aid to maritime traffic and marine science as a means of detecting changes in depth and evidence of other underwater features possibly caused by severe storms or other natural phenomena.

A "Careers in Technology" program for high school and college students involved in the Comprehensive Youth Service Program (CYSP) was recently held at the Lewis Research Center.

More than a hundred students from Cleveland's near east and near west side areas attended the one-day event. Engineers from NASA, the General Electric Co., and Polytech Incorporated described to them the flexibility of jobs available to the engineering graduate and how these various careers affect mankind's daily lives.

"We feel it is important to offer such programs because of the tremendous need for minority involvement in engineering," commented Julian M. Earls, sponsor of the program. □

ARC Completes First Automatic STOL Landings

The first successful automatic landings of a powered-lift short takeoff and landing (STOL) aircraft have been completed by Ames Research Center.

Heart of the system, called STOLAND, is a versatile airborne digital computer which provides navigation, guidance and control information to a pilot by means of advanced electronic displays. It is installed on the Augmentor Wing Jet STOL Research Aircraft, a modified C-8A "Buffalo" aircraft.

The system permits aircraft to take off and land from short runways, make steeper climbouts and approaches, and maneuver in less airspace than possible with conventional aircraft, offering potential relief for air traffic congestion. The automatic controls allow pilots to

perform steeper noise-reducing landings safely under all weather conditions.

More than half of the plane's lift is provided by engine thrust, which allows flight at much lower speeds than conventional aircraft. Also, STOLAND permits control of the aircraft's lift with automatic flaps and augmentor nozzles.

As of early August, 10 automatic landings had been conducted successfully. Gordon Hardy, STOLAND project pilot, and Fred Drinkwater, Deputy Chief of the Aircraft Operations Division, were the pilots monitoring the system as it landed the aircraft.

Shuttle Facilities Modification Contracts Let

The Kennedy Space Center recently awarded two contracts for modification of facilities looking toward the actual execution of the Space Shuttle program.

A contract to modify the Vehicle Assembly Building (VAB) for Shuttle operations was let to the Mayfair Construction Co. of Chicago, IL. Totaling $5,137,827, it provides for modifications to High Bay 3's extensible work platforms, installation of new checkout cells in High Bay 4, modification to the north door of the VAB transfer aisle, relocation of jib cranes, and modifications to related support facilities. It is scheduled to be completed within 570 days after the contractor receives notice to proceed.

The other contract, amounting to $18,749,000, was awarded Blount Brothers Construction Co. of Montgomery, AL. It involves modification of Complex 39's Pad A and conversion of a Mobile Launcher, one of the three used at Complex 39 during the Apollo program, to a Mobile Launcher Platform for Shuttle operations. Completion of Pad A work is scheduled for within 730 days after award of the contract and modification of the Launcher for within 547 days.

Pad A, which was the launch site of all but one of the Apollo/Saturn V missions and the Skylab space station, will be the launch site of all early Shuttle missions. Pad B will be modified later.

The reshaping of Complex 39 for its role in the Shuttle era is well underway. Construction of the 4,500-meter-long (15,000-foot), 90-meter-wide (300-foot) landing facility to the northwest of the VAB was begun in April, 1974, and paving is expected to be completed by the end of this year.

Experimental TV Broadcasts for India Begun

The Applications Technology Satellite-6 (ATS-6), recently moved into position for a one-year experiment to transmit instructional television programs to thousands of isolated villages throughout India, began its broadcasts on August 1.

The spacecraft is the largest and most powerful communications satellite ever developed. It is positioned 35,900 kilometers (22,300 miles) over east Africa and controlled from Goddard Space Flight Center through a ground station in Spain.

The broadcast programs, produced by India, stress improved agricultural techniques, family planning and hygiene, school instruction, and teacher education and occupational skills. Some four hours of broadcasts a day are scheduled.

About half the 5,000 villages in the experiment are equipped with TV sets augmented by converters and small antennas to receive the signal directly from ATS-6. The others receive the signal after it is rebroadcast from a ground terminal in the area.

During the first year after its launch in May, 1974, the satellite carried out pioneering demonstrations of medical and educational TV transmissions, sponsored by the Department of Health, Education and Welfare and the Veterans Administration, to remote communities in Alaska, the Rocky Mountains and Appalachia.

Galileo Scholarship Winners—The 1975 AIAA/ARC Galileo Memorial Scholarship winners and finalists recently were honored by the San Francisco Section of the American Institute of Aeronautics and Astronautics at Ames Research Center. In this photograph, Dr. Hans Mark (left), ARC Director, is shown congratulating (left to right) Ann E. Podrasky of Saratoga High School and Rogert T. Howe of Leland High School in San Jose, each of whom received a $500 scholarship; and finalists J. Lawrence Lesyna, also of Leland High, and Brian A. Stewart of Los Gatos High School, each awarded $50 savings bonds. Another finalist, Arthur Yasui of Cubberley Senior High School in Palo Alto, is not shown.

LST to Extend Space View

NASA's Large Space Telescope (LST), a multi-purpose optical telescope scheduled for launch into Earth orbit in the early 1980s, will enable scientists to gaze deep into space—seven times farther than ever before and possibly to the outer edges of the universe.

Because it will be in orbit above Earth's hazy and turbulent atmosphere, the LST will see the heavens clearly. Scientists expect the LST to add significantly to man's ability to observe the universe.

The LST project is now in the definition phase. If it moves into the development and production phase in FY 1977, then the telescope is slated to be launched in the last quarter of 1982 by the Space Shuttle.

The Shuttle, now under development, is to become operational in 1980. The LST will orbit the Earth at a nominal altitude of 500 kilometers (270 nautical miles) at an inclination of 28.8 degrees.

Aerosol Measurement Program Computed at JPL

As a result of the successful completion of a measurement program conducted at the Jet Propulsion Laboratory, scientists are a step closer to understanding the effects gases released from aerosol spray cans and refrigerators may have on the stability of the Earth's protective ozone layer.

Using a sensitive infrared spectrometer flown on a NASA U2 aircraft, JPL scientists measured the distribution of hydrogen chloride molecules at altitudes between 10 and 21 kilometers (6 and 13 miles). They found that the hydrogen chloride is distributed in a layer starting at 15 km (9 miles) altitude and reaching a maximum of almost one part per billion at about 20 km (12 miles).

Hydrogen chloride is produced by the breakdown of aerosol gas molecules in the upper atmosphere and is one of several trace gases which are thought to play a major role in controlling the equilibrium of the ozone layer.

"It should be stressed," said Dr. C. B. Farmer, leader of the JPL team, "that the results do not necessarily represent the direct effect of the use of Freons, but rather the present level which must be carefully monitored to detect any further buildup.

"Hydrogen chloride is released naturally from the surface of the oceans and can also be injected directly into the stratosphere by volcanic eruptions, although these natural processes alone would be unlikely to give rise to the amounts we observe in the stratosphere now."

The measurements are being made as a part of research directed toward the determination of the composition of the stratosphere, which is funded by NASA's Stratospheric Research Program.

Aircraft Motion Simulator Under Construction at ARC

An aeronautical facility to simulate the critical maneuvers of aircraft during takeoff and landing, when most flight problems occur, is under construction at Ames Research Center.

Called a Vertical Motion Stimulator (VMS), it will cost about $3½ million and is intended to help engineers arrive at workable designs before expensive and sometimes dangerous flight tests are necessary. It will reproduce up-and-down motions similar to those by such aircraft as the new short takeoff and landing (STOL) and vertical takeoff and landing (VTOL) planes of the future.

The VMS will accurately simulate flare and touchdown of aircraft, and will better enable pilots to cope with the complexities of flying the sophisticated aircraft now on the design boards. It is scheduled to be completed late in 1976.

Caplan Named Chief Counsel at Langley

David F. Caplan has been appointed Chief Counsel of the Langley Research Center and Wallops Flight Center, replacing George Malley, who retired on July 31 after 16 years in that position.

Caplan began working for NASA in 1966 as an attorney-advisor at the Lewis Research Center. In 1968, he was transferred to Langley as Associate Counsel.

Prior to coming with NASA, he served as attorney-advisor to the U.S. Army Tank-Automotive Command, Earlier, he had been in the private practice of law at Detroit.

Schwenk Chosen to Attend Management Program

F. Carl Schwenk

F. Carl Schwenk, Director of the Research Division in the Office of Aeronautics and Space Technology at NASA Headquarters, has been selected by the agency to attend the Advanced Management Program at Harvard University.

This program is designed for persons who have reached a top management position and desire to strengthen their competence and knowledge in long-range policy making.

A native of West Lawn, PA, Schwenk joined the Lewis Flight Propulsion Laboratory at Cleveland, OH, in 1951, later transferring to the Nuclear Reactor Division where he remained until he came to Headquarters in late 1958.

He was graduated from Penn State University in 1941 and earned his M.S. degree from the University of

Illinois, working at the latter institution as a graduate assistant. His engineering specialties include nuclear systems, propulsion thermodynamics, and fluid mechanics. Author of a number of technical papers and reports, he recently played a prominent role in planning energy research and development activities.

Dr. Paine Discusses Settlements in Space

The following article entitled "Humanity Unlimited" by Dr. Thomas O. Paine, Senior Vice President of the General Electric Co. and former Administrator of NASA, appeared in the August 25 issue of Newsweek magazine:

"Imagine, if you can, a future five centuries from now in which mankind has increased to 20,000 times its current population. Impossible, scoff the currently fashionable doomsters, who claim that if we are not atomized in a nuclear holocaust we will soon be impoverished by the exhaustion of Earth's resources. But there are other, more optimistic, scientists today who are looking into another, more expansive future—and believe that it can work.

"One of these is Dr. Gerard K. O'Neill, a Princeton physics professor, who calculates that humanity could achieve a good life, even at 20,000 times its present size, by colonizing space. O'Neill stresses that he is not prophesying the future, but he is weighing its possibilities.

"By moving into space, man could increase his cultural diversity and environmental quality, he argues, while decreasing poverty and territorial wars. He believes that the people left on Earth itself might eventually dwindle to the 1900 level of about a billion, restoring our planet to a pristine condition free of industrial contaminants. Earth would be a great place to visit, but with more desirable abodes available, most people wouldn't want to live there.

"Although I must take issue with Dr. O'Neill's timetables and cost estimates, his bold proposals are based on a realistic appraisal of potential space progress over the next hundred years and deserve serious consideration. I know what well-managed industrial and governmental organizations can achieve on the frontiers of technology, and I've visited development groups around the world that are already working on the basic technical advances and cooperative international programs required to begin work on Dr. O'Neill's plans. Let's consider his vision of the year 2075 after man's first century in space, and then review the development programs of the next 25 years that might convert his far-out proposals into a serious option for mankind.

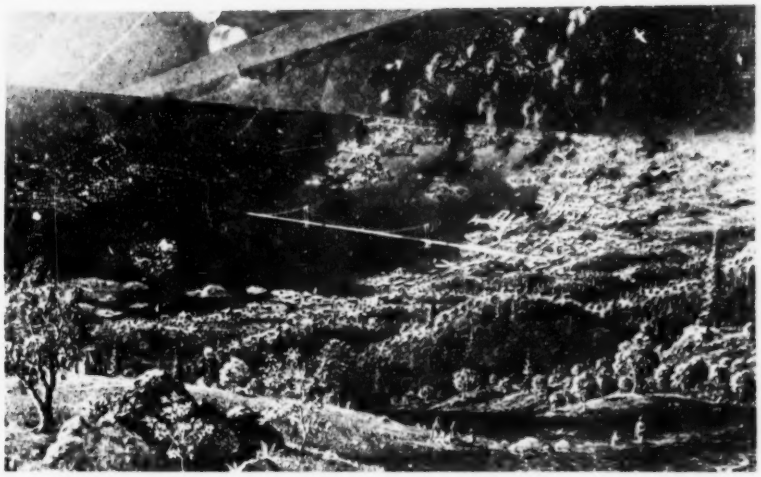
"The sun irradiates space with unlimited clean energy. Gravity and an atmosphere can be provided in two ways: on the convex surface of a massive planet or on the concave interior of a rotating space community where centrifugal force simulates gravity. Most space-colonization proposals have concentrated on the planets, but the space pioneer Tsiolkovsky suggested that artificial habitats also be considered. The Princeton proposal envisions a number of man-made space communities in the vast region between Venus and Mars, each containing several million people living on a hundred square miles of habitable acreage within a pair of cylinders about four miles in diameter and 20 miles long.

"A rotation rate of half a revolution per minute would stimulate Earth's gravity. The sparkling atmosphere inside the cylinders would include a blue sky fleeced with white clouds and occasional sprinkles of rain. Three long mirrors with matching windows along the sides would flood the interior with sunlight. Opening and closing the mirrors on a 24-hour cycle would move the reflected sun across the sky as in a normal Earth day, with seasonal variations as desired. Animals, birds, flowers and trees would share the parklike environment with people, but agricultural production of natural fresh foods would be carried out in attached nonrotating pods so zero gravity and continuous sunlight could enhance productivity. Similar pods would be available for astronomical observatories, hospitals, sports arenas and industrial and recycling processes. Steam-turbine generators energized by solar boilers would furnish abundant clean power; electric vehicles and bicycles would provide transportation.

"To increase the attractiveness of the environment, Dr. O'Neill suggests lakes for fishing, swimming and sailing and sculptured end caps of the cylinders reproducing features of the Earth's mountain terrain for hiking and skiing. Mountaineers would find one difference, though—as they scaled the peaks in space, they'd notice the simulated gravity progressively weakening, with complete weightlessness achieved at the peak. At a lesser altitude, weight would decline to the point where people with artificial wings could fly.

"With no friction or gravity to overcome, space travel between communities would be relatively simple. Low-cost family-recreation vehicles consisting of pressurized shells with living quarters and recirculating atmospheres could visit other communities of diverse cultures across the solar system. The construction of new habitats to house emigrants from Earth and also future generations would be a major activity on the space frontier. At first, the equipment and critical supplies would be furnished from Earth, but raw materials needed for expansion could be supplied at lower cost from a small moon colony. For example, 89 percent of the weight of the water required in space could come from oxygen extracted from lunar soil, the remaining 11 percent being supplied as liquid hydrogren from Earth.

"It's hard enough to predict tomorrow, but a few men with technical vision have looked a century ahead with



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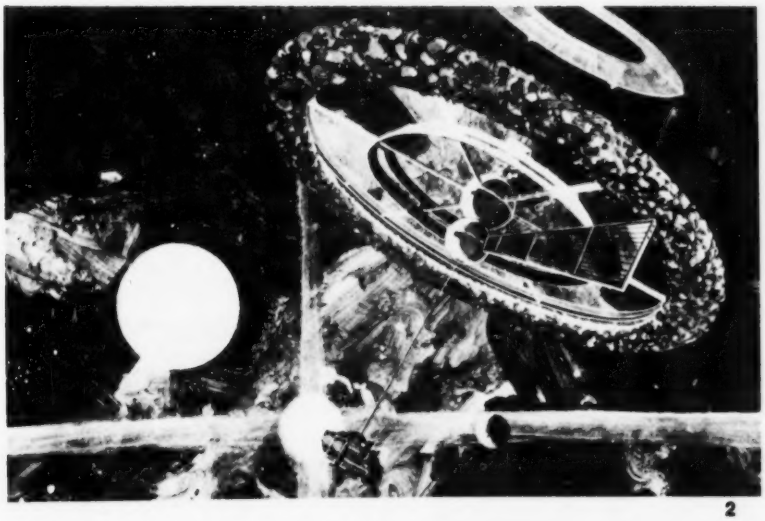

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Living in Space—These concepts of space colonies created beyond the gravity of Earth grew out of the 10-week Ames Research Center-Stanford University summer study completed recently at ARC.

In Photo No. 1, Artist Don Davis pictures how a space colony might appear. Capable of supporting several hundred thousand persons, it would be cylinder-shaped, 32 kilometers (19 miles) long, 6,400 meters (4 miles) in diameter. The cylinder would rotate on its axis every 114 seconds to create Earth-like gravity.

Photo No. 2 depicts a wheel-like colony of 10,000 inhabitants. It would be over a mile in diameter. The 20 professors from major U.S. universities who did the study say it might be built with existing technology in 20 years and might well pay for itself. It would have an Earth-like interior environment and landscape, and would rotate around its hub at one revolution per minute, fast enough so that the centrifugal force felt by its inhabitants would simulate their normal weight on Earth.

A cylinder in which an entire Earth atmosphere is reproduced is visualized by the artist in Photo No. 3. Solar energy would supply power, while raw materials could be derived from lunar rocks or asteroids. Large movable, rectangular mirrors would direct sunlight into the interior, regulating the seasons and controlling the day-night cycle. The Earth in this concept is creating an eclipse with the space colony.

Photo No. 4 shows a segment of the space colony during final construction. Depicted in this conception is an agricultural area with a lake and a river. These farming sections are interspersed with three more populated areas and would be protected by a shield of lunar slag attached to the outside of the colony shell.

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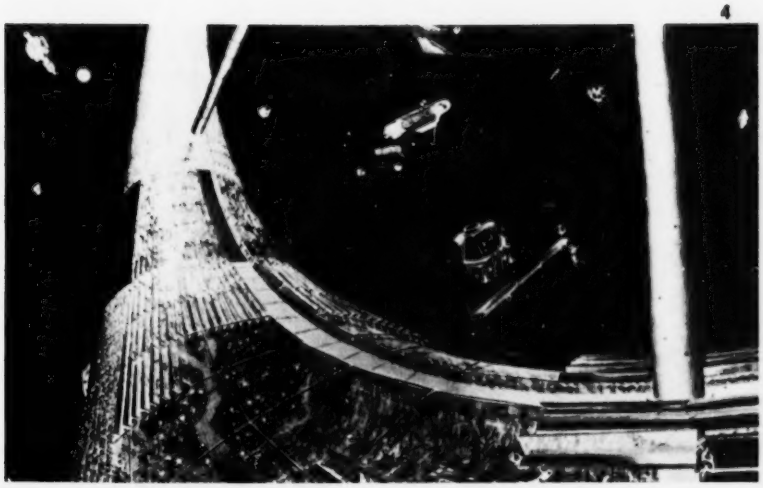

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remarkable clarity. A hundred years ago, Jules Verne foresaw the Apollo program in extraordinary detail by consulting creative scientists and imaginatively projecting the future developments that their work implied. The best way to judge the potential of the Princeton proposal, then, is to assess relevant work now under way in the avant-garde of space technology.

"In Palmdale, Calif., U.S. space technicians are asembling the powerful new delta-winged Space Shuttle. This reusable rocket will initiate economical round-trip service to orbit in the 1980s. Apollo was the Viking ship of space capable of daring voyages for brief forays, but the Shuttle will be the practical caravel that opens space for permanent settlement and economic development. In Noordwijk, Holland, the European Space Agency's $400 million Spacelab program is well under way. The U.S.-USSR Apollo-Soyuz project provides further foundations for the international space-transportation systems and orbital facilities of the 1980s required to begin work on Dr. O'Neill's far-out proposals. In the 1990s, these could readily be extended to establish and support the required lunar base. There is no reason to believe that the technology will not be ready to launch the next exciting phase in man's evolution.

"Far-out is not far-fetched."

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Better Short-Haul System Object of ARC Program

A new program initiated at Ames Research Center to modify a government-furnished de Havilland C-8 Buffalo transport aircraft into a quiet short-haul research aircraft (QSRA) is expected to benefit air travelers, airport communities and airline operators.

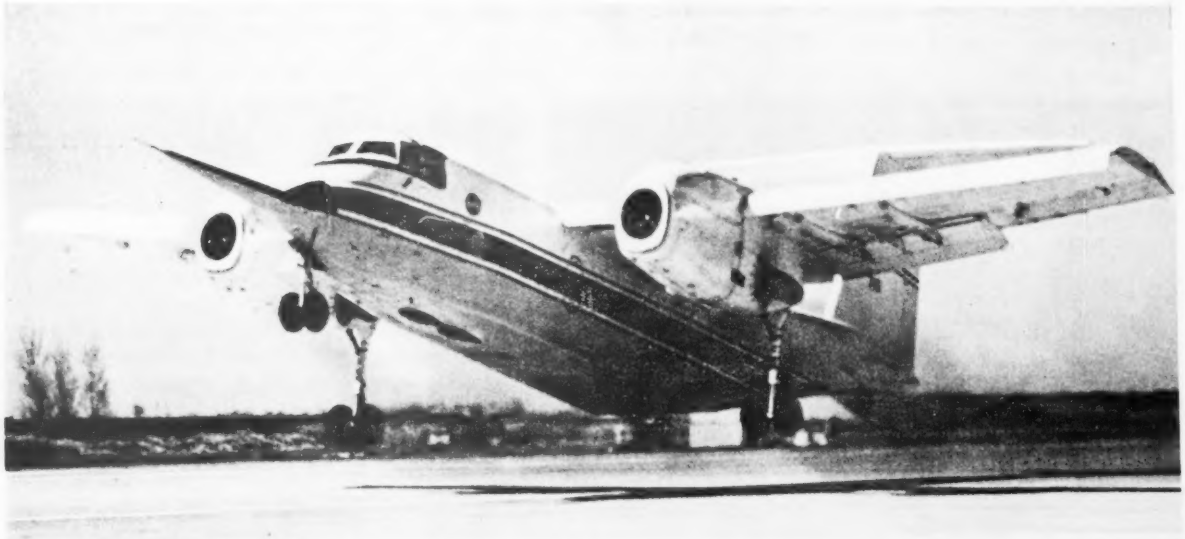
With short-haul travel (less than 600 miles) accounting for about half of all U.S. air travel demands at present, need is seen for a better short-haul system, including environmentally acceptable aircraft, noise and congestion relief, fuel conservation, frequent and economical passenger service, as well as profit for operators and manufacturers.

One solution seems to rest in the application of propulsive lift technology to achieve short takeoff and landing (STOL) aircraft. These could use shorter runways at existing community airports and new STOL ports. They also could operate from separate runways and in a separate but compatible traffic pattern with conventional aircraft at the existing larger hub airports.

In the quiet propulsive-lift concept employed in the QSRA, turbofan jet engine exhaust is directed over the top surface of the wing and trailing edge wing flaps to augment the aerodynamic wing lift. Furthermore, part of the air from the engines is directed through the wing to provide supplementary blowing over selected wing flap and aileron surfaces to enhance aircraft performance and control at low speeds.

Boeing Commercial Airplane Co., Seattle, WA, and Lockheed-Georgia Co., Marietta, GA, have been selected for competitive negotiations leading to the award of a contract to modify the "Buffalo" transport.

Plane Used in Tests—This extensively modified deHavilland C-8A "Buffalo" aircraft is of the type used in the automatic landings at Ames Research Center. It has jet engines in place of the original turbopropers, as well as new, shortened wings with augmentor flaps, boundary-layer control ailerons and spoilers.



FRC Makes First Unpowered Landing of RPRV

The first dead-stick landing of a Remotely Piloted Research Vehicle (RPRV), a technique that provides a more economical and far less hazardous means of flight test, was made recently by Flight Research Center.

The new method involves the air launch of large-scale models from a carrier aircraft flying at high altitudes. A test pilot in a ground cockpit, fitted with flight instruments and flight controls, flies the RPRV through the desired test maneuvers by using telemetry and television.

Originally, mid-air recovery of the RPRV was made by using a parachute and helicopter. As results were less than 100 percent, however, it was decided to develop an independent landing capability.

In applying the new technique recently, Center Project Pilot Einar Enevoldson brought the RPRV to a landing on a dry lakebed, using small steel skids which had been individually mounted on the ends of three conventional automobile shock absorbers, installed inside the aircraft's fuselage and compressed to allow the skids to fit flush with the bottom of the aircraft. When he was ready to lower the landing gear, he electronically sent a signal that released the gear and allowed the compressed nitrogen system to extend the skids.

For this flight, the RPRV was launched from a B-52 flying at 48,000 feet. The 24-foot-long aircraft was then flown into a spin and maneuvers were performed to measure control effectiveness during spinning flight. The spin was continued until an altitude of approximately 15,000 feet was reached, at which time the landing gear was deployed and a series of stability and control maneuvers were flown.

Final approach to the runway on the lakebed began at about 5,000 feet. A television camera in the cockpit of the RPRV provided visual information to the ground pilot.

International Women's Year Speaker—While attending the International Women's Year observance at Headquarters recently as the principal speaker, the Honorable Ann Kilgore (left), Mayor of Hampton, VA, was photographed as she received a memento of her visit from Delores Hart, Federal Women's Program Coordinator. (See story on Page 3.)

Award for Saturn Safety—Michael J. Marchese (second from left), aerospace engineer at the Michoud Assembly Facility, recently was presented the New Orleans Federal Business Association's Eagle Award for Distinguished Service in the business professional category for his dedication and outstanding performance in assuring the reliability and systems safety of Saturn vehicles fabricated at Michoud. Pictured with him, left to right, are the Hon. James A. Moreau, Councilman at Large, who presented a certificate from the Mayor of New Orleans; Dr. John Lockwood Ochsner, guest speaker; and Grace B. Taranto, President of the Association.

Tossed Bottle Returns After 4½ Years

A bottle Curtis Hunt of the Public Affairs Office at Marshall Space Flight Center dropped into the Pacific Ocean 200 miles south of Samoa came back to him recently, after four and a half years.

The dropping took place on Feb. 10, 1971, from the deck of the U.S.S. *New Orleans,* the ship that only the day before had picked up the Apollo 14 crew, Alan Shephard, Edgar Mitchell and Stuart Roosa, after their return from the Moon.

Sealed with plastic tape and fitted with a screw cap, the bottle contained a message of thanks to the captain and crew of the ship signed by 60 civilians on board, including personnel from General Electric, Western Union, Comsat and NASA. Also in the bottle was a to-whom-it-may-concern message of identification from Hunt asking the finder to write him.

The finder was Don Dawson of Bedford Park, South Australia. He had come across the bottle on July 14, 1975, while he and his family were vacationing on Fraser Island, 200 miles north of Brisbane.

"This letter may come as a surprise to you," he wrote Hunt by way of understatement in a letter that reached its destination on August 14.

NASA Employee Consultant for World War II Book

The Sept. 1 issue of Time Magazine published a review of a new book, "WWII" by James Jones. It is identified as a giant words-and-pictures history of the second World War, with graphic and design by Art Weithas. But no mention is made that a NASA employee, Ann Weeks of the Headquarters Public Information Division, was Washington Consultant for the volume and one of two persons most responsible for bringing it into existence.

Ann's role began soon after she received—a little more than a year ago—a letter from Weithas, a friend with whom she had worked as a journalist in New York for several years. He inquired whether Government agencies had inherited or been given World War II artwork by American GIs, recalling that he himself had donated to the War Department some of his own art prepared while serving as Art Director of YANK, the Army weekly.

She struck a cold trail in the beginning, for the office that had acknowledged receipt of Weithas' art had been abolished. But she began a tracking operation that took in the Army, Navy, Marines, Coast Guard, Smithsonian, Library of Congress and other agencies. She found that each of those she contacted did indeed have World War II art collections, all in the public domain. Included was not only American art, but German and Japanese paintings and even one by Adolph Hitler.

Then she and Weithas began further collaboration. They settled on Grosset and Dunlap for a publisher. The author? It was their consensus that there could be only one choice—James Jones, an Army enlisted man at Pearl Harbor who was later wounded by shrapnel at Guadalcanal.

Jones, author of "From Here to Eternity" and "The Thin Red Line," was living in Paris, but was in the mood to move back to America. In the meantime, Weithas, supplied with Ann's findings, viewed hundreds of paintings and made selections.

"Weithas, Jones and I," Ann recalls, "worked together for several months and finally—with a great deal of help from high-ranking people in all the agencies—had the package together. Considering the logistics alone of the job, we think it is something of a miracle that the book will be on sale a little more than a year after it was only an idea—mid-September is publication date."

Lazar Heads Division

James Lazar has been appointed Director of the Space Propulsion and Power Division in the Office of Aeronautics and Space Technology at NASA Headquarters.

He also has been selected by the American Institute of Aeronautics and Astronautics to receive the 1975 AIAA James H. Wyld Propulsion Award given annually "for outstanding leadership of this nation's advanced propulsion program in the field of electric rocket propulsion.

A graduate of Rensselaer Polytechnic Institute in 1948, Lazar was employed at the Lewis Research Center at Cleveland, OH, where he conducted research in the fields of jet engine controls and servomechanisms. In 1954, he joined Flight Refueling, Inc., where as Project Engineer he was in charge of the company's research and development effort related to fluid systems components.

Returning to NASA in 1968, he was responsible for the agency's research effort in electric thrusters and later for the flight testing of electric thruster systems.

Rowe to Head New External Affairs Post

Herbert J. Rowe

Herber J. Rowe, Chairman of the Board of Directors of PEMCOR, Inc., an Illinois electronics manufacturing and electric equipment distributing corporation, has been appointed to the new position of Associate Administrator for External Affairs at NASA Headquarters.

In his new post, he will be primarily concerned with coordinating activities of the Office of Industry Affairs and Technology Utilization and the Office of Public Affairs, Dr. James C. Fletcher, NASA Administrator, said in announcing the appointment.

The overall objective will be to coordinate the efforts of NASA departments involved in external affairs and responsible for disseminating information about agency programs.

Rowe served with the Marine Corps from 1942 to 1946 and again from 1950 to 1952. He has been PEMCOR Board Chairman since the corporation was formed in 1971.

Museum Gets First Space Hardware—As shown by these photographs, the nation's new National Air and Space Museum is rapidly nearing completion. Already it is being occupied by personnel and supplied with exhibits, preparing for its formal opening on July 4, 1976. The first space hardware to be moved into the building, as pictured, was the four-stage, solid-fuel Scout vehicle, the type of spacecraft used to launch 17 satellites from Wallops Flight Center, VA, ranging from the Explorer IX, sent aloft on Feb. 16, 1961, to the Explorer 46 (MTS), launched on Aug. 13, 1972.

Space Museum Seeks Volunteer Helpers

Officials of the Smithsonian Institution's National Air and Space Museum, now in the closing months of its construction, are looking for volunteers to aid visitors to the spacious building, interpret its galleries, provide guided school activities, and assist curators.

Several NASA retirees already are engaged in this activity, according to R. Lynn Bondurant, Education Officer for the Museum, but others are needed.

The Education Office of the Presentations and Education Division is recruiting volunteers in the following four categories:

Docents—Museum teachers and lecturers who provide the leadership for school and other organized group tours.

Museum rovers—to move from gallery to gallery answering questions which arise pertaining to exhibits or Museum.

Information Desk volunteers—to serve at the Information Desk and be responsible for answering questions concerning either the Museum or Smithsonian Institution.

Museum aides—to assist in the library, preview films, file, type, or help in various ways in the Aeronautics, Astronautics, Presentations and Education Division, or Science and Technology Departments.

Positions are available for both weekends and week days. Volunteers will be provided training by the Education Office.

Applicants should contact Bondurant by writing him in care of the Museum or phoning him at 381-4166.

NASA Employees Invited to Forum

Smithsonian Institution's National Air and Space Museum has invited NASA employees, as well as all other persons interested in aerospace topics, to attend a Lunchbox Forum to be held in the Freer Gallery of Art Auditorium at 12th St. and Independence Avenue S.W. from noon to 1 p.m. Oct. 15.

Held monthly, these forums will extend into 1976.

The speaker at the October meeting will be Ronald Miller, Staff Artist of the Museum's Presentations and Education Division. His topic will be "An Artist's Tour of the Solar System."

After an introduction to planetary art, he will provide a guided tour of the solar system by means of planetary landscapes he has painted.

Medical Interns Near End of Course—The Johnson Space Center's first medical interns, studying under a program to provide highly-motivated students an opportunity to apply their knowledge in support of manned space flight, soon will complete their tours of duty in the Life Sciences Directorate. Top to bottom, they are Janet Carr, Meharry Medical School; Michael Darden, Howard University Medical School; and Deborah Ponds, Georgetown University.

Rasool Named New Deputy Associate Administrator

Dr. S. Ichtiaque Rasool, Special Assistant to the Deputy Associate Administrator of NASA, has been appointed Deputy Associate Administrator for Space Science (Science) to succeed Dr. Henry J. Smith, recently transferred to Goddard Space Flight Center.

In his new position, Dr. Rasool will be the primary advisor to Dr. Noel W. Hinners, the Associate Administrator for Space Science, regarding the goals and objectives of the Space Science Program. He will also serve as Chairman of the Space Science Steering Committee, responsible for drawing the skills and resources of the nation's scientific community into the NASA program of scientific space exploration.

Dr. Rasool, a native of Lucknow, India, came to NASA from the National Academy of Sciences in January, 1965. He served as Senior Research Scientist at the Goddard Institute for Space Studies until November, 1971, at which time he was appointed to the position of Deputy Director for Planetary Programs in the Office of Space Science. He was made Special Assistant to the Deputy Associate Administrator in October, 1974.

Awarding GSFC's Largest Minority Contract—Goddard Space Flight Center recently awarded a contract valued at approximately $1,225,000 to the Small Business Administration and the Clean-Rite Maintenance Co., Inc., of Washington, DC, for janitorial and grounds maintenance services. It was MSFC's largest minority contract and NASA's first to include incentive provisions.

The company is owned and operated by Nathaniel D. Williams (seated, right), shown here watching as Michael Ladomrak, GSFC's Procurement Officer, signs the contract. Looking on, left to right, are Edythe Coopersmith, contract negotiator; Jacques Knox, GSFC's Plant Operations and Maintenance Director; Robert Smaldore, of the Center's Office of Industry Assistance; and Norma Prince of SBA.

Astronaut Pogue to Leave NASA

Astronaut William R. Pogue, pilot of Skylab 4, the longest manned space flight to date, has announced that he will resign from NASA to accept a position as Vice President of High Flight Foundation, Colorado Springs, CO, an evangelistic organization founded by James B. Irwin, who retired as an astronaut in 1972.

Both Pogue, an Air Force colonel, and Gerald P. Carr, a Marine Corps colonel, who was commander of Skylab 4, retired from military service Sept. 1, the former after 24½ years and the latter after 22 years.

Carr will remain with NASA as a civilian astronaut.

ASTP Experiment Tested—The flight unit of the Electrophoresis Technology Experiment System flown aboard the Apollo Soyuz Test Project is shown undergoing tests and fit-checks at the Marshall Space Flight Center. Principal investigator for the experiment is Dr. Robert E. Allen (center), Chief of the Bio-technology Branch of the Materials and Processes Lab. Assisting in the tests were Billy Nerren (right) of the same branch and Robert L. Crippen, a support astronaut assigned to ASTP from the Johnson Space Center.

Seeds for World Friendship—The box of "super" spruce tree seeds shown in the inset, enough to cover an entire acre of ground, was presented the Russian cosmonauts by the American astronauts during the recent Apollo Soyuz Test Project mission. It was the first natural resource science gift to be exchanged in space, the Russians presenting the Apollo crew with Siberian larch, Scotch pine and Nordmann fir seed. The seed from the U.S., developed through cross pollination at the U.S. Forest Service's Institute of Forest Genetics at Rhinelander, WI, near the home of ASTP Astronaut "Deke" Slayton, produces faster-growing trees of exceptional height and shape which reduce chemical and noise pollutants, remove dust and pollen from the air, and act as windbreaks. They also have fewer knots and thus are more desirable as lumber for the manufacture of furniture.

Radio-Television

(Released Nationally)

TELEVISION—Two color film releases in the *Aeronautics and Space Report* monthly series: "Space Shuttle," (featuring Dr. Myron Malkin, Director of the Space Shuttle Program). RADIO—Five weekly *Space Story* programs have been released: "Space Shuttle Development," (JSC/Thompson); "Aircraft Wake Turbulence," (FRC/Dave Scott); "NASA-NYC Liquefied Natural Gas Assist," (KSC/Fedor); "Space Shuttle Launch Status," (KSC/Gray); and "Apollo-Soyuz Mission Summary," (Hqs/Lee). One monthly *NASA Special Report*, "Apollo-Soyuz Mission Summary," (Hqs/Lee).

Headquarters Press Releases

(Issued by the Public Information Division, Code FP, Headquarters, Washington, DC 20546. These releases are available only to members of the news media.)

75–217 Echo Satellite, Seen by Millions, Launched 15 Years Ago
75–218 Symposium on Earth and Mars at KSC
75–219 Contract Awarded for Shuttle Launch Processing System
75–220 Goddard Awards Minority Contract
75–221 NASA Satellite Begins Experimental TV Broadcasts for India
75–222 NTE/Two Briefings Slated for Viking
75–223 Aerosol Measurements Program Completed at JPL
75–224 Vertical Motion Simulator Being Built at Ames
75–225 Chicago Firm Awarded VAB Modification Contract
75–226 First Automatic Landings Made With STOLAND System
75–227 Shuttle Facilities Modification Contract Let to Alabama Firm
75–228 Contract Awarded for Shuttle Booster Separations Motor
75–229 NTE/Preliminary Report on Space Colonization to Be Given at Ames
75–230 NTE/Astronauts, Cosmonauts to Make Joint Tour
75–231 Intelsat Press Kit
75–233 Astronauts Carr and Pogue Retire from Military
75–234 Symphonie-B Press Kit
75–235 Astronaut Slayton to Undergo Surgery
75–236 NTE/NASA announces Change in Astronaut-Cosmonaut Tour
75–237 NASA Establishes New External Affairs Post
75–238 McDonnell Douglas Named to Produce Shuttle Booster Components

Lunar Sample Exhibits

The following is a schedule of lunar sample exhibits from Sept. 15 to Oct. 15, 1975:

South Carolina—Thornwell Museum, Clinton, Oct. 6.
Tennessee—TVA Bicentennial Caravan, Knoxville, Oct. 1, 1975, through Dec. 15, 1976.
Virginia—University of Virginia, Charlottesville, Oct. 11.
Wisconsin—Rock River Geological Society, Jefferson, Oct. 4-5.
American Freedom Train—Omaha, NE, Sept. 17; Denver, CO, Sept. 23; Casper, WY, Sept. 30; Billings, MO, Oct. 3; Salt Lake City, UT, Oct. 8; Boise, ID, Oct. 15.
High Flight Foundation-Bicentennial Mobile Space Museum—Franklin, PA, Sept. 16-21; Hartford City, IN, Sept. 23-28; Delaware, Sept. 30-Oct. 5; Maryland, Oct. 7-12; Fredericksburg, VA, Oct. 14-19.

Long Term Displays

Alabama—Alabama Space and Rocket Center, Marshall Space Flight Center, Huntsville.
Florida—Visitor Information Center, Kennedy Space Center.
Kansas—Eisenhower Library, 200 SE 4th Street, Abilene.
New York—United Nations Building, New York City.
Ohio—USAF Museum, Wright Patterson AFB.
Texas—Johnson Library, University of Texas, Austin; Visitor Information Center, Johnson Space Center, Houston.
Virginia—Visitor Information Center, Langley Research Center, Hampton.
Washington, DC—National Geographic Museum; Smithsonian Institution, National Air and Space Museum, 1000 Jefferson Drive; Washington National Cathedral.

NASA Film Announcements

"Four Rooms—Earth View," a 28-minute film depicting the Skylab missions, has been released with Actor E. G. Marshall as moderator and narrator.

Also released is "The Time of Apollo," a 28-minute film that looks back six years to determine the true meaning of the Apollo lunar landing program. Burgess Meredith narrates it.

The final two films in the "Rediscovery" series have been released. They are entitled "Pollution Below" and "Flood Below."

The NASA film "Who's Out There?" has been honored in competition to receive a Silver Screen Award from the Industrial Film Festival.

The film "Rediscovery—Pollution Below" has received a Chris Bronze Plaque Award from the 23rd Annual Columbus Film Festival.

New NASA Publications

AGRICULTURE is a 10-panel, 9-by-21-centimeter pamphlet describing how aircraft and Earth-orbiting spacecraft operated by NASA are contributing to a new era in agriculture that may enable food production to keep better pace with mankind's requirements. It is available agencywide from educational and public information offices.

THE SPECTRUM, a four-color, 54-by-120-centimeter foldout wallsheet, is designed for classroom use. Profusely illustrated, the chart gives meaning to the full scope of the electro-magnetic spectrum and its applications to Earth science, communications, life science and astronomy. It is for sale by the Superintendent of Documents, Government Printing Office, for 60 cents each. (NF-54)

WHY SURVEY FROM SPACE? This 12-page, four-color pamphlet defines users and uses of surveys, tells how to make one's own ground survey, or how to obtain space and aerial photography and, among other things, offers useful tips on lighting and timing of survey photos. It is for sale by the Superintendent of Documents for 45 cents each. (NF-57)

Patents for Inventions from NASA Research

The Office of General Counsel, NASA Headquarters, announces that the following U.S. patents have been issued by the U.S. Patent Office to NASA for inventions resulting from NASA research. Inquiries concerning them should be directed to the attention of the NASA Patent Counsel for the indicated installation.

Inventor(s) and Employer(s)	Title and NASA Docket	Patent No.	Installation
John D. Dibattista, NASA/LaRC	Meteoroid Impact Position Locator Aid for Manned Space Vehicles (LAR-10,629-1)	3,896,758	LaRC
Dr. Erwin S. Hochmair, National Academy of Sciences, Washington, DC	Integrable Power Gyrator (MFS-22,342-1)	3,898,578	MSFC
Paul R. Prokopius, NASA/LeRC	Flow Measuring Apparatus (LEW-12,078-1)	3,898,882	LaRC
Frededick T. Schuller and Warren A. Moore, NASA/LeRC	Journal Bearings (LEW-11,076-3)	3,899,224	LeRC
James A. Webster, Monsanto Research Corp., Dayton, OH	Perfluoro Alklene Diosybis-(4-Phthalic Anhydrides and OXY-Bis-) Perfluoroalkyleneoxy-Phthalic Anhydrides (MFS-22,356-1)	3,899,517	MSFC
Raymond K. Burns, Lloyd T. Shure and Elliott D. Katzen, NASA/LeRC	Protected Isotope Heat Source (LEW-11,227-1)	3,899,680	LeRC
Katsunori Shimada, Caltech/JPL, Pasadena, CA	Electric Power Generation System Directly from Laser Power (NPO-13,308-1)	3,899,696	NaPO
William M. Daly and John F. McKenna, Jr., Mass. Institute of Technology, Cambridge, MA	Fault Tolerant Clock Apparatus Utilizing a Controlled Minority of Clock Elements (MSC-12,531-1)	3,900,741	JSC
Ernest R. Steele, NASA/ERC	Satellite Aided Vehicle Avoidance System (ERC-10,419-1)	3,900,847	NaPO
Robert C. Clauss and Ervin R. Wiebe, Caltech/JPL	Refrigerated Coaxial Coupling (NPO-13,504-1)	3,903,143	NaPO
William H. Haraway, Jr., Walter J. Dale and Edwin A. McErlean, NASA/LaRC	Improved Bonding Method in the Manufacture of Continuous Regression Rate Sensor Devices (LAR-10,337-1)	3,898,730	LaRC
John Dimeff, NASA/ARC	An Ndir Gas Analyzer Based on Absorption Modulation Ratios for Known and Unknown Samples (ARC-10,802-1)	3,899,252	ARC
Martial A. Honnell, Auburn University, Auburn, AL	Isolated Output System for a Class D Switching-Mode Amplifier (MFS-21,616-1)	3,899,745	MSFC
Ian A. Richter, NASA/KSC	Dual Digital Video Switcher (KSC-10,782-1)	3,900,705	KSC

Projected Launch Schedule

(*As of Aug. 26, 1975*)

Name	Launch Date	Vehicle	Range	Mission Remarks
Navy	Sept. 25	Scout	WTR	Navy navigation satellite. Reimbursable.
Atmosphere-D	Sept.	Delta	WTR	A scientific satellite to investigate the chemical processes and energy transfer mechanisms which control Earth's atmosphere.
SMS-C (GOES-A)	Oct.	Delta	ETR	First operational synchronous meteorological satellite of the National Weather Service of the Department of Commerce to provide continuous daytime and nighttime global cloud cover observations.
Dual Air Density	Nov. 20	Scout	WTR	Two scientific spacecraft will be placed in orbit to obtain simultaneously measurements of the composition of upper and lower levels of atmosphere.
ITOS-E2	Nov.	Delta	WTR	Operational meteorological satellite of the National Weather Service to provide daytime and nighttime cloud cover imagery. Reimbursable.
Atmosphere-E	Nov.	Delta	ETR	Scientific satellite to investigate the chemical processes and energy transfer mechanisms which control Earth's atmosphere.
Intelsat IVA-B	4th Qtr.	Atlas-Centaur	ETR	Second of a series of improved Intelsat Consortium satellites. Reimbursable.

RCA-A	4th Qtr.	Delta	ETR	First of a series of domestic communications satellites for RCA. Reimbursable.
Helios-B	Dec.	Titan TIII-Centaur	ETR	Second West German/NASA cooperative satellite to investigate the properties and processes in interplanetary space close to the Sun.
1976				
CAS-C/CTS	Jan.	Delta	ETR	Canadian-US cooperative experimental communications satellite to develop and test the technology of high power satellite communications systems.
NATO-C	Feb.	Delta	ETR	Communications satellite in synchronous orbit to perform communications relay for NATO. Reimbursable.
RCA-B	March	Delta	ETR	Second domestic communications satellite for RCA. Reimbursable.
Relativity (Gravity Probe)	(Under Study)	Scout	WI	Scientific satellite to make a test of Einstein's Theory of Relativity.
Marisat-A	(Under Study)	Delta	ETR	Comsat Corp. satellite to provide maritime satellite communications services. Reimbursable.
Comstar-A	1st Qtr.	Atlas-Centaur	ETR	Domestic communications satellite for Comsat Corp. Reimbursable.
Intelsat IVA-C	1st Qtr.	Atlas-Centaur	ETR	Third of a series of improved Intelsat Consortium satellites. Reimbursable.
Marisat-B	2nd Qtr.	Delta	ETR	Second Comsat Corp. satellite to provide maritime satellite communications services. Reimbursable.
Westar-C	(Under study)	Delta	ETR	Backup domestic communications spacecraft for Western Union. Reimbursable.
Marisat-C	2nd Qtr.	Delta	ETR	Third Comsat Corp. satellite to provide maritime satelli communications services. Reimbursable.
Comstar-B	2nd Qtr.	Atlas-Centaur	ETR	Second domestic communications satellite for Comsat. Reimbursable.
Indonesia-A	3rd Qtr.	Delta	ETR	Indonesian communications satellite. Reimbursable.
RCA-C	2nd Half	Delta	ETR	Third domestic communications satellite for RCA. Reimbursable.
SIRIO-A	4th Qtr.	Delta	ETR	Italian project to investigate radio propagation, trapped radiation flux, magnetic field intensity and variation, and the primary electron energy spectrum. Reimbursable.
GOES-B	4th Qtr.	Delta	ETR	Second operational satellite to provide continuous daytime and nighttime global cloud cover observations for NOAA. Reimbursable.
ITOS-H	4th Qtr.	Delta	ETR	Operational meteorological satellite to provide daytime and nighttime cloud cover imagery for NOAA. Reimbursable.
Comstar-C	4th Qtr.	Delta	ETR	Domestic communications satellite for Comsat. Reimbursable.

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For a penny of your tax dollar,
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A Versatile Padding Material for Airlines, Hospitals and Football Players

When scientists at Ames Research Center began work on a padding concept back in 1968, they were looking for a new type of airplane seat. But what they came up with was the jackpot—a low-cost urethane foam cushion with factors that will benefit not only airline passengers, but bedridden patients, handicapped children and even football players.

Investigations of many aircraft accidents had revealed that inadequate seat designs contributed to impact fatalities and injuries. It was known that seat improvements had not kept pace with aircraft designs and that these incidents would continue to occur until seats were built which were more in line with the new generation of aircraft.

The concept the ARC scientists developed now has been placed on the market by the manufacturing firm of Edmont-Wilson, Soshocton, Ohio, under the trade name of Temper Foam.

Temper Foam gets softer when warmed, firmer when cooled. It fully recovers after a 90 percent sustained compression. It is an energy absorber, taking sudden impact without shock or bounce. A three-inch-thick, seat-size pad can absorb the energy of a 10-foot fall. It can be cleaned by soaking in a mild solution of warm water and soap, or sterilized in an oven at temperatures of 200 to 250.

Hospitals find it ideal for orthopedic and prosthetic cases, eliminating pain caused by long periods of pressure. Bedsores are a thing of the past. Moreover, patients who heretofore could spend no more than three hours at a time in a standard wheelchair were able, by using cushions

such as that on which the model is seated in the photograph, to spend in excess of 10 hours continuously without discomfort.

The sports world likewise gathered it in with open arms. Used as an interior padding material for football helmets, it adjusts to the shape of the wearer's head without putting undue pressure on any one point. Baseballs dropped from the same height on two identical-sized pieces of padding—one of the closed-cell vinyl used in most helmets and the other of Temper Foam—caused 340 percent less shock or bounce when they impacted the latter.

NASA

National Aeronautics and
Space Administration

"For the benefit of all mankind"

AMERICAN REVOLUTION BICENTENNIAL 1776-1976